

### **REMARKS/ARGUMENTS**

Reconsideration of this application is requested. Claims 1-3, 5-10 and 14-17 are active in the application subsequent to entry of this Amendment.

The specification and claims have been amended to respond to the examiner's comments on pages 2 and 3 of the Official Action. More specifically, responsive to item 1, a new Abstract has been submitted based upon that contained in the published PCT application.

The spelling with respect to "pentene" has been corrected in claim 4 (now incorporated into claim 1) while claims 11-13 have been deleted.

In order to more particularly point out and distinctly claim that which applicants regard as their invention, the monomers listed in the specification, with the exclusion of polypropylene, have been included in part (I) of claim 1. Basis for this may be found in the second paragraph on page 6 of the specification as well as in previous claim 4, now cancelled.

Additional claim changes include new claim 16 directed to a preferred aspect of the invention described in the paragraph bridging pages 18 and 19 of the specification and included as claim 10 as attached to the IPER. Also included is new claim 17 which corresponds to claim 12 in the claim set attached to the IPER. Claim 12 is directed to a process of reducing reactor fouling during polymerization of an olefin, an important aspect of this disclosure as discussed in the specification in the last paragraph of page 20 and elsewhere.

Claims 3 and 10 have been amended to agree with the terminology employed in independent claims 1 and 7, respectively. Claim 7 is revised to attend to the issues raised by the examiner and address those questions presented in the paragraph bridging pages 2 and 3 of the Official Action. The aluminoxanes and polyfunctional organic crosslinkers at the end of part (A) of claim 7 are reacted with the inorganic oxide to form the catalyst support, and claim 7 has been amended to reflect this. The carbon atom limit in line 21

of claim 7 (as previously presented) has been clarified to specify that the alkylaryl group must have at least seven carbon atoms consistent with the claim as presented and attached to the IPER. Further, the preferred activity maxima has been deleted from the last portion of claim 7.

With the above changes accomplished it is submitted that the objections raised in items 1-3 of the Official Action have been resolved. If for any reason the examiner has continuing concerns as to claim formality and clarity, please contact the undersigned.

The balance of the Official Action deals with five separate prior art-based rejections to which applicants respond in detail below in the event the examiner's concerns may extend to the new and amended claims presented above.

In item 5 the Examiner argues that the claims 1-6 and 8-13 lack novelty in view of WO 97/27224 (Andell). Applicants disagree. In particular, the Examiner highlights the examples and disclosure on page 10, lines 13 to 34. Looking firstly at the examples, the Examiner will note that the metallocene is contacted with the olefin (e.g. vinyl cyclohexane) in solution. The resulting preinitiated catalyst is then impregnated into a silica support. All the examples in this Andell reference use this procedure. Unlike Andell claim 1 of the instant application requires that the prepolymerisation reaction takes place on an already supported olefin polymerisation catalyst. In Andell the catalyst is not supported when the contact between the olefin and catalyst occurs and hence these examples cannot destroy the novelty of claim 1.

In addition to the above the Examiner will also consider claim 1 of the Andell reference which explicitly states that the catalyst system obtained in Andell is obtained "as a reaction product dissolved in the organic solvent" used in the reaction. The metallocene is therefore contacted with the olefin in an organic solvent and the resulting preinitiated catalyst dissolves in the solvent.

Andell's process therefore eliminates the possibility of the metallocene catalyst being supported when the preinitiation takes place. If a catalyst that is supported is used in the process described by Andell, the reaction product will not be soluble in an organic

solvent. There can be no way therefore that claim 1 of the present case is anticipated by Andell.

In item 7 of the Action the Examiner argues claims 1-15 are not patentable over the Andell reference. Applicants disagree. For the reasons mentioned above in connection with novelty, the Examiner will immediately realize that the process described by Andell is very different from that claimed in the instant application. The Examiner should note that Andell is not actually concerned with a prepolymerisation reaction at all, rather the invention involves a "preinitiation".

On page 6, line 9 of Andell it is stated that:

"It has been discovered by that contacting a homogeneous catalyst system in the solution and a lower amount of an unsaturated organic compound than the amount used in prepolymerisation, the product thus obtained is both stable as well as accessible to the growing polymer chain ...".

Moreover, on page 6, lines 28 to 31, Andell contrasts prepolymerisation and preinitiation. A prepolymerisation product is an insoluble or precipitable mixture of the catalyst components and prepolymer formed. As mentioned above, the preinitiation product formed by Andell is required to be soluble.

That there is a great difference between preinitiation and prepolymerisation is evident from the amount of olefin employed in each process. The amount of olefin used in Andell is 0.05 to 500 mols of unsaturated organic compound per mol of transition metal of the transition metal compound. In the examples 0.04 cm<sup>3</sup> of olefin is employed. This is much less than is used in a prepolymerisation reaction where olefin is fed to a reactor in high amounts. On page 18 of the instant application, suggested amounts of olefin feed are 0.05 to 20 g monomer/gcat/h. It is not therefore believed that Andell is at all relevant to applicants' claims. Withdrawal of this rejection is requested.

In item 8 the Examiner raises a further obviousness rejection based on the Covezzi document EP-A-517183. Covezzi does at least describe a prepolymerisation reaction but only in the context of Ziegler Natta catalysts. While metallocenes were of course well

known at the priority date of the present invention, Ziegler Natta and metallocene catalyst technologies are very different and it is not believed that it is obvious simply to change from one catalyst technology to the other. The catalysts give rise to polymers having quite different properties. For example, metallocenes tend to give polymers of narrow molecular weight distribution. Moreover, the conditions under which the catalysts operate are different and it is not routine simply to switch them round – nor does the art suggest this. Despite metallocenes having been known for many years, there are still very few commercial polymer grades made using such catalysts which emphasizes the difficulties the polymer chemist has in commercializing metallocene polymers.

As discussed above, claim 1 has been amended to specify that the olefins must be C<sub>4</sub> and above. Claims 4 and 11-13 have been deleted.

Since claim 1 no longer includes propylene as the prepolymerisation monomer, the Covezzi reference is still yet further distinguished. Covezzi requires the prepolymerisation reaction to take place in the presence of propylene. The Examiner must also note that the prepolymerized catalyst in claim 1 of the instant application is isolated, i.e. the process cannot be continuous. According to the Covezzi reference on page 3, line 44, the process described therein is continuous. According to page 4, line 44 of Covezzi, step (b) can be carried out continuously or intermittently but it is not to be isolated.

The Examiner is additionally advised that the reductions in reactor fouling – the subject of new claim 17 -- achieved by the present invention are not suggested anywhere in the Covezzi prior art (or any of the other cited prior art). None of the prior art highlights that reduced reactor fouling can be achieved by using the modified olefin polymerisation catalyst suggested in the instant application. The inventors have realized that if a particular olefin is used in the modification of the olefin polymerisation catalyst, a reduction in reactor fouling can be achieved during the actual main polymerization reaction. Specifically, the inventors have realized that by using olefins which give rise to prepolymerized olefins of melting point 20<sup>0</sup>C higher than that of the main polymerization

polymer reactor fouling can be reduced. New claim 17 is specifically directed to this attractive and important feature of the present invention.

Much of the prior art does suggest the possibility of using various olefins during a prepolymerisation stage. It is conceded that prepolymerisation was known at the priority date. However, none of the prior art appreciates the benefits in *prepolymerisation* in connection with reactor fouling. Prepolymerization has been carried out for many years to improve particle homogeneity since it increases the size of catalyst particles put into the main reactor thereby ensuring excellent homogeneity.

Considering next the rejection in item 9 of claims 1-5, the Shinozaki reference describes a process for the preparation of polypropylene and a polypropylene block copolymer using a Ziegler Natta type catalyst formed from a titanium catalyst component, an organometallic component, an organosilica compound and a polyether compound. Shinozaki suggests that the catalyst may be prepolymerized using a variety of olefins such as 3 methyl-1-butene but the document does not mention metallocenes. Again, it is not considered obvious to change from Ziegler Natta to metallocene catalysis. The invention in Shinozaki is concerned with the formation of a particular highly isotactic polypropylene using a well characterized catalyst. There is no incentive for the person skilled in the art to change to a metallocene. Moreover, according to column 21, line 32 the prepolymerization may be carried out batchwise, semi-continuously or continuously. There is no particular suggestion therefore of isolation of the catalyst.

Regarding item 10 of the Action and the rejection of claims 1-15, applicants submit that the disclosure in EP-A-321218 (Kioka) is similar to that of Shinozaki. Kioka suggests prepolymerisation of Ziegler-Natta polymers using 3-methyl-1-butene so arguments above apply *mutatis mutandis* to Kioka. It is stressed however that Kioka nor Shinozaki addresses the problem of reactor fouling in connection with metallocene catalysis.

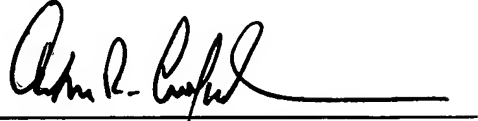
For the above reasons it is respectfully submitted that the claims of this application define inventive subject matter. Reconsideration and allowance are solicited.

ERNST et al  
Appl. No. 10/089,049  
September 3, 2004

Respectfully submitted,

**NIXON & VANDERHYE P.C.**

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